

REMARKS

Claims 1 and 3-15 were pending in this application, claims 4-6 and 11-13 having been deemed to present allowable subject matter and only having been objected to as being dependent upon rejected base claims. Claims 1, 3, 7-10, 14 and 15 were rejected. By this Amendment Applicants have cancelled claims 1 and 9, leaving claims 3-8 and 10-15 pending, and revised claims 3-8 and 10-15. Claims 3-6, 8, 11-13 and 15 are independent.

The Examiner is thanked for the indication of allowable subject matter in claims 4-6 and 11-13. Those claims have been placed into independent form and so are believed to be in condition for allowance (while the language added to place those claims into independent form differs slightly from the language of now-cancelled base claims 1 and 9, such differences are not believed to affect the allowability of these claims).

The Rejections Under 35 U.S.C. § 103

Claims 1, 3, 7-10 and 14-15 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,460,984 to Matsumoto et al. in view of U.S. Patent No. 6,332,481 to Shinada et al.¹

Applicants respectfully traverse this rejection, and submit the following arguments in support thereof.

First, it will be appreciated that the cancellation of claims 1 and 9 renders moot the corresponding portions of this rejection.

¹ Shinada is commonly assigned along with the present application. To the extent this response discusses Shinada, such discussion involves the general teachings of that reference, and should not necessarily be construed to limit the scope of the claims of Shinada or its counterparts. If Shinada is characterized as teaching a particular feature or mode of operation, the claims of that reference and its counterparts should not necessarily be construed to require that feature or mode of operation unless the feature or mode of operation is specifically recited in the claims.

Applicants' invention, as recited in claim 3, involves an ink cartridge having an ink chamber storing ink, an ink supply port communicating with the ink chamber and adapted to engage an ink supply needle formed in a mounting portion of a recording apparatus so that the ink is supplied to a recording head of the recording apparatus when the ink cartridge is mounted in the mounting portion, and a retaining member having a projected portion adapted to engage with an engaging portion formed in the mounting portion. A valve device has a biasing member provided in the ink supply port and is configured to normally keep closed the valve device, and when the ink supply needle is inserted to the ink supply port, the valve device is opened against the biasing member so as to resiliently abut the projected portion to the engaging portion. The valve device includes a valve body and a coil spring.

In the interests of brevity, Applicants will not separately summarize the other pending independent claims. For the purpose of this response, it is submitted that those claims include features which are comparable to features of claim 3 that will be shown to patentably distinguish over the cited art (of course, the scope of those other claims should be determined based upon the language used in those claims, and not the arguments presented hereafter).

As explained in detail below, the cited references are not properly combined, and, even if combined, fail to suggest this invention. The claimed invention provides for a relationship between the elastic force of the biasing member and the friction force generated between the sealing member and the ink supply needle. In contrast, the cited references only teach a valve mechanism that opens or closes the ink supply port, and does not suggest the claimed relationship between the elastic and friction forces.

The Office Action states that Matsumoto lacks a valve device having a biasing member that is provided in the ink supply port, and other aspects of this invention (Office Action, p. 3, first full paragraph). The Office Action, however, is wrong - Matsumoto describes such a valve and criticizes it strongly (so one skilled in the art would not use it).

Matsumoto discusses and disparages in extended detail at col. 54, line 4, through col. 55, line 2, the use of a spring-actuated valve, which is the type of valve taught by Shinada. Matsumoto gives multiple forceful reasons why the spring-actuated valve is **undesirable**:

Conventionally, as the structure of connecting portion to airtightly close the opening of the ink container, there is known a valve mechanism that uses a ball and a spring that biases the ball. The operating value for use of the liquid container formed by such valve mechanism performs the opening and closing by means of the elasticity of the spring member, and particularly it is effective in the mode that ink is directly contained in the ink container of the ink container. The valve mechanism that uses the ball and the spring member is caused to open when ink container is installed on the tank holder or the like. In this case, the ink container is pressed to the tank holder. Then, with the communication tube or the like provided for the tank holder, the ball is compressed to shift, thus opening the valve.

However, the opening/closing valve for use of the liquid container that uses the ball and the spring member as described above has one opening and closing portion for the liquid supply to one liquid supply tube. **Then, if the opening and closing portion is solidified or clogged, the liquid supply path is blocked in some cases. As a result, there is a fear that the appropriate liquid supply to the outside of the liquid container becomes impossible, and the system is regarded as insecure in terms of the reliability of liquid supply.**

Also, in order to secure the aperture area for the liquid supply, the diameter is made smaller for the abutting member to enable the ball to move, there are some cases where the ball is caught in the space provided for the opening and closing operation depending on the operational resistance of the ball, the abutting portion, or the like, hence making it impossible to execute the reliable and quick operation. In such a case, **there is a fear that the liquid supply is disabled when the liquid container is connected or the ink leakage takes place when the liquid**

container is removed. Also, if the abutting portion is made larger in anticipation of the exact operation, the aperture area becomes smaller. Thus, the security of the aperture area and the reliability of the opening and closing operation are the trade-off between them.

Further, the valve using the ball and the spring member requires many numbers of parts that constitute the valve. Therefore, the parameters that have bearing on the sealing capability are the ball, the bearing surface, the compression force of the spring, and many others. Then, **there is a problem that the precision tolerance becomes smaller when the valve is finally assembled.** Particularly, if each of the components to form the valve is produced by different materials, the **cost of manufacture becomes high inevitably.** Also, **there is a need for selecting each material** for each component while considering the each component **in terms of the assembling capability and resistance to ink.**

(emphasis added).

In view of these passages, one skilled in the art would disregard and not apply to Matsumoto the teachings of Shinada, which has just such a spring-operated valve (see Figs. 1-2, valve body 11, spring 13, valve seat 10a; col. 3, lines 25-41), since Shinada employs precisely the type of valve that Matsumoto says is undesirable and which therefore should not be used.

While Matsumoto itself employs a valve of different construction to prevent ink leakage from ink container 50 (col. 58, lines 42-64), Matsumoto only states that the valve structure is designed to prevent ink leakage. Nowhere does Matsumoto even suggest the valve could serve to bias the ink cartridge in its mount. There is no suggestion in Matsumoto that the valve be designed in the manner claimed so that when the ink supply needle is inserted into the ink supply port the valve device is opened against the biasing member to resiliently abut the projected portion against the engaging portion.

Some claims of this application provide for a coil spring, precisely the type of spring Matsumoto disparages and says is to be avoided. For this reason as well those claims avoid Matsumoto.

Matsumoto therefore by its own teachings (1) precludes the combination of Matsumoto with Shinada, and (2) teaches away from the invention as claimed.

Even in the event that Matsumoto were combined with Shinada (which Applicants respectfully submit is not possible), that still would not suggest all the features of the present invention.

As the Office Action admits, Matsumoto does not disclose a valve device with a biasing member in the ink supply port that is configured to normally keep closed the valve device, or that, when the ink supply needle is inserted into the ink supply port, the valve device is opened against the biasing member so as to resiliently abut the projected portion to the engaging portion.

While Shinada teaches a spring 13 that causes valve body 11 to close against valve seat 10a, there is no teaching of the magnitude of the force exerted by the spring, meaning Shinada does not suggest the projected portion is thereby caused to resiliently abut the engaging portion. Shinada therefore suffers from the same deficiencies as Matsumoto, meaning the claims avoid the combination of these references for the same reasons they avoid Matsumoto alone.

For all the foregoing reasons, the claimed invention patentably distinguishes over the cited references, whether taken alone or in combination. Accordingly, favorable reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

Applicants respectfully submit that all outstanding rejections and objections have been addressed and are now overcome. Applicants further submit that all claims pending in this application are patentable over the prior art. Favorable reconsideration, withdrawal of all rejections and objections, and the allowance of all pending claims are respectfully requested.

Other than the additional claims fees authorized in the accompanying Fee Transmittal form, no fees are believed to be owed in connection with this Amendment. Nevertheless, the Commissioner is hereby authorized to charge any fees now or hereafter due to Deposit Account No. 19-4709.

Favorable consideration and prompt allowance of this application is respectfully requested. In the event that there are any questions, or should additional information be required, please contact applicant's attorney at the number listed below.

Respectfully submitted,

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